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METEOROLOGY IN FRANCE.

Resuming our notice of the first volume of the *Annales du Bureau Central Météorologique*, we have first two papers by M. Edmond Becquerel on underground temperature observations made at the Natural History Museum during 1877 and 1878 by means of electric thermometers. The observations may be divided into two series —(1) those relating to variation in temperature due to depth below the surface; (2) those indicating the influence upon underground temperature produced by the turfed or bare state of the soil.

The first series give the following results :—

Depth. French. Metres.	Depth. English. ft.	in.		Mean temperature 1861-78. Centigrade. °	Fahr. °	Diff. for equal increments of depth.
1	3	3	.....	11·25	52·25	
6	19	8	.....	11·97	53·55	+1·30
11	36	1	.....	12·02	53·64	+ ·09
16	52	6	.....	12·07	53·73	+ ·09
21	68	11	.....	12·11	53·80	+ ·07
26	85	4	.....	12·38	54·28	+ ·48
31	101	8	.....	12·34	54·21	— ·07
36	118	1	.....	12·44	54·39	+ ·18

It is very clear from the last column that there is some serious cause for doubting these results. M. Becquerel ignores the most startling irregularity, viz., that between one metre and six metres, but he says that the irregularities at 16 and 26 metres are due to the subterranean water stratum. The observations at 6, 11, 16, 31, and 36 metres are very fairly in accordance, but they accord in giving an increase of only 1° in 156 ft. against 1° in 54 ft. at Kentish Town, or (better comparison still, for it is close by) 1° in 59 ft. in the Puit de Grenelle at Paris.

The final results of mean annual temperature under bare and turfed soil are, in Fahrenheit degrees, as follows :—

Depth.	2 in.	4 in.	8 in.	1 ft.	2 ft.
Turfed	53·20	53·17	52·86	53·06	52·79
Bare	52·50	51·91	51·40	51·51	51·82
Difference	—0·70	—1·26	—1·46	—1·55	—0·97

The next article is by M. Angot, and is introductory to, and ex-

planatory of, a set of tables for reducing barometric readings to their equivalent sea level pressures. We consider that they are the most generally useful yet issued for instruments with metric scales, accurate and compact. M. Angot also shows observers how to combine the tables, for the correction of the readings at their own station by a single operation.

M. Hildebrand Hildebrandsson in a paper on the freezing of the lakes, and on phenological phenomena, in Sweden, attacks the question as to the existence or otherwise of any material change in the seasons during the last or present century, and finds no distinct evidence of any change.

The last memoir in the volume is a history, by M. Rollin, of the hurricane which passed from the Bay of Biscay across the centre of France during February 20th, 1879. The article is very interesting, very well written, illustrated by synoptic charts for each third hour from 9 a.m. to 9 p.m., both inclusive, and will in all respects well repay perusal. We can spare space for only a few remarks.

The only deficiency which we notice in the paper is that of tables. M. Rollin has succeeded in writing a very agreeable memoir, but every now and then we miss some data of which we should have been glad, *e.g.*, on page C 50, there is a paragraph embodying the observations on the light-ship off Rochebonne, but a little table giving the readings *in extenso* would have been most useful.

The dissimilarity between the ordinary 8 a.m. international chart for Feb. 20th, which is here reprinted, and the special one for 9 a.m., only one hour later, is to us an unpleasant feature; for one cannot but see that the 8 a.m. isobars would have been less incorrect had they not been carried out beyond terra firma. That a hurricane with a baric minimum of about 730$^{mm.}$ (28·74 in.) should be within fifty or sixty miles of a coast well provided with observing stations, and yet should not have given sufficient indication of its presence to prevent the authorities from running an isobar of 745$^{mm.}$ (29·33 in.) through its centre, shows either sluggishness in the barometers employed, or an insufficient number of stations; but beyond all it shows, as we have already said, how risky it is to draw isobars over seas whence no observations have been received.

At the same time that we protest against isobars based chiefly upon the imagination, we are very glad to express our opinion that even now, it is not easy to suggest what better warnings could have been issued than those that were actually despatched.

We may quote an instance or two illustrative of the force of both wind and tide. At Bordeaux, a vessel was driven irresistibly on to a sand bank and completely beached, the furious sea continued to push it, and finally drove it through the bank into deep and smooth water beyond. At Barbezieux in Charente, M. Gillet saw the body of a little cart taken off its axle by the wind, and by calculation based on its weight, its area, the angle at which the cart was placed, &c., he found that the velocity of the wind was 80 miles an hour,

which, says M. Rollin, is almost identical with the rate of translation (85 miles) of the hurricane itself as far as Nevers.

Here is a note bearing upon the late Tay Bridge inquiry :—

The verbatim report of the sitting of the Meteorological Commission of l'Allier, furnishes us with a fact illustrating the extreme force of the tempest. Monsieur Voisin has calculated that a minimum force of 138 kilogrammes per square metre (34¼ lbs. per square foot) would have been necessary for the wind, in order to throw over in Sioule, four carriages of a train passing over the viaduct of Saint Bonnet, of which the height above low water mark is 66 metres (217 feet). He adds, that the bridge has been calculated to resist a wind exercising a lateral pressure of 170 kilogrammes per square metre (42 lbs. per square foot).

With respect to barometric variations, we have the actual values for Clermont, and diagrams for the Puy-de-Dôme and for Rochefort. As we have already said, we regret the absence of some tabular matter, but the barometer curves are so remarkable that we have done our best to determine the values in English measures. Of course, the minimum occurred much earlier at Rochefort on the coast than in Auvergne ; it was almost exactly three hours earlier, but, in order that the table may not be confused by this fact, all the Rochefort figures are entered lower than the others, this brings all the minima into one line, and the time being separately given prevents all confusion.

ROCHEFORT.			PUY-DE-DÔME.			CLERMONT.	
Time.	Reading.	Fall or Rise per hour.	Time.	Reading.	Fall or Rise per hour.	Reading.	Fall or Rise per hour.
	in.	in.		in.	in.	in.	in.
			6 a.m...	24·63		28·17	
			9 a.m...	24·56	—·02	28·06	—·04
9 a.m...	29·28	—·14	Noon ...	24·33	—·08	27·89	—·06
Noon ...	28·86	—·02	3 p.m...	23·93	—·13	27·66	—·08
0½ p.m...	28·85	+·27	3¼ p.m...	23·91	—·08	27·60	—·24
2 p.m...	29·26	+·15	3½ p.m...	...	...	...	...
3 p.m...	29·41		4¾ p.m...	23·89	—·01	27·60	—·00
			5 p.m...	...	...	...	...
			6 p.m...	24·07	+·14	27·74	+·11

We are inclined to regard the rate of rise reported from Rochefort 0·41 in. in an hour and a half, or 0·27 in. per hour, as extremely rapid, but we know of no table giving a list of extremely rapid barometric changes. Perhaps somebody will either state where one is to be found, or will compile one.

In conclusion, we must congratulate M. Mascart on his first volume. It is our duty to point out features which appear to us capable of improvement, but it is also a duty, and a far more agreeable one, to praise that which seems worthy of it. Probably it may be long ere we can spare space to notice subsequent volumes at equal length, but we think that our readers will join us in anticipating much pleasant and instructive reading in the *Annales du Bureau Central Météorologique de France.*

GREENWICH OBSERVATORY.

UNDER the combined influences of a slight relaxation in the exclusiveness of the invitations, and of fine weather, "Visitation-day" drew a large gathering to the establishment of which Englishmen are so justly proud, and which Sir George Airy directs with as much vigour as he did when he was appointed Astronomer Royal very nearly half a century since.

The following are the paragraphs of the annual report which bear most closely upon meteorology :—

"The exceptionally bad weather of the past summer has seriously interfered with the observations, a whole month's observations of the sun being lost in July.

"The Thomson Electrometer is in excellent order. In the warm weather of summer, and in winter when much artificial heat is used in the basement, the photographs have been unsatisfactory, but we are endeavouring to remedy this by cutting off all communication with air from the basement. In the winter the register was frequently interrupted by the freezing of the water in the exit-pipe. A basin (with cesspool) has been recently constructed to carry off the water discharged from this pipe.

"The action of the photographic barometer appears to have been improved by the slight changes mentioned in the last report, and small movements are in many cases excellently shown.

"A new pressure-plate with springs has been applied by Mr. Browning to Osler's Anemometer, and it is proposed to make such modification as will give a scale extending to 50 lbs. pressure on the square foot. Other parts of the instrument have also been renewed. An arrangement for slow motion of the barrel, which was much wanted in adjusting the recording paper, has been fitted to Robinson's Anemometer.

"It is in contemplation to alter the photographic cylinders of the magnetometers, barometer, thermometers, and earth-current apparatus, so as to make the time-scales of all the magnetical and meteorological instruments the same.

"The radiation thermometers were shifted at the end of January to a more open position in the south ground.

"All thermometers in ordinary use have been compared with the standard.

"Since last October the Police-ship "Royalist" has been laid up in dock, having been injured by a collision, and the observations of temperature of the Thames have been interrupted in consequence.

"The mean temperature of the year 1879 was 46°·1, being 3°·3 below the average of the preceding 38 years. The highest temperature was 80°·6 on July 30, and the lowest 13°·7 on December 7. The mean temperature was below the average in every month of the year ; the months of greatest deviation being January and December, respectively 6°·8 and 7°·6 below the average ; the months of April, May, July, and November were each between 4° and 5° below the average.

"The mean daily motion of the air in 1879 was 268 miles, being 11 miles less than the average. In July the mean daily motion was 78 miles above the average, and in December 75 miles below. The greatest daily motion was 705 miles on December 30, and the least 32 miles on October 12.

"The vane of Osler's anemometer made, in the year 1879, thirty-one complete revolutions in the positive direction N, E, S, W, N.

"The number of hours of bright sunshine, recorded with Campbell's sunshine instrument, during 1879, was only 983. At Glynde (near Lewes) the

number of hours registered with a similar instrument, erected by the Right Hon. H. Brand, Speaker of the House of Commons, was 1040, being larger than at Greenwich in April, May, and October, and smaller in July. At Mr. Campbell's request and private expense a diagram has been prepared, under the Observatory superintendence, exhibiting the record of sunshine on each day throughout the year 1879.

"From various causes the magnetical and meteorological reductions had gradually fallen behind, and an endeavour is now being made to bring them into a more forward state."

THE WEATHER IN MAY.

The anticyclone which lay over these islands during the last four days of April was shown in much the same position on the 1st May. Pressure, however, had begun to decrease, and a depression was in course of formation in the S. On the 2nd the bar. fell over the whole of Western Europe, and the distribution became irregular; areas of high pressure lying over Ireland and Denmark, and of low pressure over Scotland and France. A recovery began on the next day in N. Scotland and over Scandinavia, as well as in S. France; the rise in the N. extending slowly southward later in the day. Readings were highest over the Baltic, lowest over France.

Very dry and moderately clear weather was almost general during the week (4th–10th). On the 4th the bar. rose in all parts of Western Europe, but fell in the extreme N. of Norway and Sweden. An area of high pressure was over the northern and western coasts of our islands, and low readings were reported from France, N. Germany, and N.W. Norway. A slow decrease began on the following day in the N., but still increased nearly everywhere else. The distribution of pressure during the next two days was subject to little change. On the 8th the bar. fell on the W. and S.W. coasts of these islands and over Sweden, while it rose elsewhere. An area of high readings lay over Great Britain, a small depression off our S.W. coasts, and larger disturbances over the Baltic and S.E. France.

Temperature was below the mean everywhere; as much as 5° or 6° at most places in England, and from 2° to 4° elsewhere. The maximum was generally very low for the time of year, and over the central and northern parts of Great Britain and central Ireland several slight frosts occurred, the lowest minimum being 28° at Durham. Rainfall again less than the average in all districts.

Bright sunshine, except in the western parts of Great Britain, showed a decided decrease. In S. and E. England and E. Scotland the number of hours recorded was only about one-fourth of the total possible duration. In London the per centage was particularly small.

The weather during the following week (11th–17th) continued clear and very dry over Great Britain and the Continent. In Ireland the sky was cloudy or overcast at the beginning of the week.

The changes in atmospheric pressure were very irregular, but slight. Readings were high throughout the week (especially over these islands), except over the N. coast of Spain and at Biarritz.

Temperature was several degrees higher than during the week preceding. It was about the mean in S. England and S. Ireland, but below the average elsewhere. On the 14th and 15th the ther. was especially high, and in the S. of England very high readings were recorded: 78° at Southampton, 75° at Hastings and in London, 74° at Strathfield Turgiss. At Yarmouth the maximum was only 55°, and at Durham 59°, the deficit from the average being as much as 4°·3 at the former place, and 5°·5 at the latter.

Rainfall nil at many places, and scarcely measurable at many more other places. The largest falls were 0·36 in. at Valentia, 0·29 in. at Roche's Point, 0·41 in. at Leicester, and 0·23 in. at Strathfield Turgiss.

During the following week (18th–24th) several important changes in the distribution of atmospheric pressure occurred. On the 18th the bar. began to

fall slowly in the N. of Great Britain, while it rose elsewhere—especially in the S.W. This fall continued during the day, and the centre of a small depression lay off the coast of Norway, while the area of high pressure was off the W. coast of Ireland.

In the course of the following 24 hours a rather large depression advanced from the Atlantic to the coast of Norway; the bar. consequently fell rather briskly over the countries to the E. of the North Sea, while over the whole of these Islands and France it rose, the change being greatest in the N. of Scotland. Pressure remained steady in the W. Later in the day (20th) a decrease of pressure began in Scotland, which the charts of the 21st showed to be caused by the advance of a secondary depression, travelling eastward; pressure thus becoming highest in the S.W. During the 21st and the night (21st-22nd) a considerable fall of the bar. took place over the whole of Western Europe; the centre of a well-formed depression having passed across the northern part of these Islands, which disappeared in the course of the day. The bar. then rose, but in the early morning of the 23rd a large depression appeared in the N.W. of these Islands, causing pressure to decrease rapidly; the weather gradually becoming unsettled.

Temperature from 18th to 22nd changed irregularly, but a general fall was reported on the morning of the 22nd, the decrease being as much as 5° or 6° in Scandinavia, 6° to 8° in Belgium, and 7° at Liverpool. The difference in the maxima of the two days, 22nd and 23rd, was 13° in London and Cambridge, 11° at Oxford, and 8° at Nottingham.

Rainfall at the early part of the week was nil or nearly so generally, and very slight during the remainder.

Changeable weather was experienced during the remaining days of May. The sky was moderately clear on the 25th, 26th, 28th, and 29th; but on the other days the weather was generally cloudy or dull. Thunderstorms, accompanied by heavy rain, occurred at some places on the 26th, and again on the 28th.

Pressure was highest over France, or France and the southern English coast, until the 31st, when an area of high pressure was shown over the Baltic, while depressions were over our western coasts and the Gulf of Lyons.

Temperature varied very much, but was on the whole somewhat below the average for the time of year everywhere. At the beginning of the week high readings were reported from all parts of the United Kingdom, and in London and at Cambridge temperatures of 86° and 82° respectively were recorded on the 26th. Temp. stood much lower during the last few days of the month, the nights being very cold. The lowest reading, namely 30° in the shade, was recorded at Shrewsbury early in the morning of the 28th. On this occasion sharp ground frosts were experienced in many parts of England. The greatest deficit from the mean was 7°·3 at Churchstoke, 7°·2 at Shrewsbury, 6°·9 at Manchester, and 5°·3 at Pembroke. The only places at which the mean temp. was in excess of the average were Nairn and London, the former being 1°·0 above the mean, and the latter 0°·7.

Rainfall was less than the mean in S. England, and over Scotland; above it elsewhere. The greatest falls were 2·42 inches at Shrewsbury, 2·37 inches at Churchstoke, and 2·01 inches at Manchester; the slightest were 0·20 inch at Lowestoft, and 0·02 inch at Hastings.

Bright sunshine showed a decrease, except over S. and E. England and in the N. of Ireland. Maximum duration, 53 hours at Durham, 52 hours at Aberdeen and Southampton; minimum duration, 37 hours at Parsonstown, 36 hours at Llandudno, 34 hours at Churchstoke and Glasgow. The amount at Parsonstown is only 33 per cent., at Llandudno 32 per cent., at Churchstoke and Glasgow only 30 per cent. of the total possible duration.

Lowestoft. H. E. M.

THE DRY PERIOD.

To the Editor of the Meteorological Magazine.

SIR,—The past eight months have been exceptionally dry at Bedford, and we appear still to be in a cycle of unusual atmospheric deviations from normal conditions. The altitude of this station is 115 feet above the level of the sea, and the average annual rainfall as recorded at Cardington (about 2 miles distant), by Mr. Maclaren, for 34 years is 22·39 inches. To show the evaporation, I also add the percolation through two feet and a half of pretty pervious soil, as measured by a gauge on the Dalton principle :—

	Rainfall. in.		Percolation. in.
1879.			
October	0·71	.....	0·57
November	0·78	.....	0·56
December	0·48	.....	0·28
1880.			
January	0·32	.....	0·38
February	1·93	.....	1·43
March	1·70	.....	1·25
April	1·60	.....	0·62
May	1·11	.....	0·11
	8·63		5·20

As the winter rains in a great measure supply the summer water, it is sure to be very scarce in many places, if the summer should be dry and hot.—Yours truly,

DAVID ROBIE.

Bedford, 1st June, 1880.

[From the above the rainfall, during the seven months, appears to have been only 60 per cent. of the average for the same period.—Ed.]

THE HEAT OF MAY 26TH IN LONDON AND IN NEW YORK.

Somebody—Prof. Piazzi Smyth, we believe—used the term "Wave of Heat." As it implies nothing very definite and sounds well, we find that it has been extensively used, and we suppose that in future we shall not read of "Hot Periods" or "Hot Spells," as the Americans used to describe a period of high temperature, but the fashion will be to follow the suit of a London journal, and write of the "First Wave of Heat." However, if the heat will only come, it will matter little how it is described, but after the experience of 1879, we ought to be very thankful for all the sunshine we can get.

It is a very singular coincidence (which certainly ought to be cleared up by those who are watching the sun's surface in order thereby to predict the weather) that May 26th was excessively hot, both in London and in America.

We append two extracts from *The Times*, which we will leave without further comment, except that we believe that the Greenwich temperature of 87°·5 on May 26th was not merely, as is stated, the highest since 1841, but the highest there since 1793. In 1807 there was a reading of 84°·0 at Somerset House, which, perhaps, represents an equal temperature, and in 1868 the temperature at Greenwich on May 19th was 87°·0, but there is certainly no evidence of the temperature of 1880, May 26th, having been surpassed *at Greenwich.* At Camden Square, however, the figures, though not differing widely, are reversed, the maximum having been 87°·6 on May 19th, 1868, and 85°·1 on May 21st, 1870, while May 26th, 1880, gave only 85°·0.

THE UNITED STATES.

(By Anglo-American Cables.)

The intense heat continues on the Atlantic coast, but a lower temperature is expected to-night. Thirty-two cases of sunstroke and six deaths occurred in New York on Thursday (27th). There have been five deaths from the same cause in Philadelphia, two in Jersey City, and two in Newburg, New York.

Philadelphia, May 28th.

First Wave of Heat.—The *New York Times* describes the last Tuesday and Wednesday in May as days of extraordinary heat in that city. "At 3 a.m. on the 26th the thermometer was at 74°, and it had reached 80° at 9 o'clock. At noon the mercury at the Signal Service station on Broadway, 140 ft. above the pavement, stood at 90° in the shade. The morning reports showed that the extreme heat prevailed over the entire country east of the Mississippi, with a slight exception in favour of the Gulf coast line." Cheyenne, at the foot of the Rocky Mountains, reported a temperature of 33°, or one above freezing; at Lowell, Massachusetts, it was 102°. At our own Royal Observatory, at Greenwich, the *maximum* on the 26th wrs 87·5°, which is higher than any reading recorded there since July 31st, 1877, and is the highest recorded in May in the 40 years, 1841–1880.

REVIEWS.

Meteorological Observations made at the Adelaide Observatory during the year 1878, *under the direction of* Charles Todd, C.M.G., F.R.A.S., *Postmaster General and Superintendent of Telegraphs.* Fcap. folio. Adelaide: E. Spiller, Government Printer.

This volume contains far more than the title indicates, and affords material for half-a-dozen articles. We think—considering the immense importance of the stations which Mr. Todd has established in the very heart of the Australian continent, the results of which are given in this volume—that in future the title should run, "Meteorological Observations made at the Adelaide Observatory, *and at the Second Order Stations in South Australia* during the year, &c."

We are rather surprised to find that Mr. Todd adopts the somewhat primitive arrangement of reduction to sea level by the application of a *constant* correction of +·154 in. for 140 ft. We find that

the air temperature at Adelaide ranged from 36° to 114° during the year. For these values the corrections for 140 ft. would be—

			30·578		29·401
Temp.	114°	.....	·140	.....	·133
,, ...	36°	.....	·164	.....	·154

We are glad to find that fortunately both extremes of pressure occurred with air temperatures between 50° and 55°. The real figures are, therefore, very nearly the same as those given by Mr. Todd. The following table shows the whole of the facts :—

	As published.	Deduct the Constant.	Pressure at 140 ft.	Correction for 53° & 140 ft.	
Maximum pressure ...	30·578	—·154	30·424	·156	30·580
Minimum ,, ...	29·401	—·154	29·247	·150	29·397

Although in this case the errors are only a few thousandths, the previous example shows that with the temperatures experienced at Adelaide it might amount to ·021 in., and as the use of a small table, very easily calculated from Mr. Scott's instructions or any similar work, would render the correction perfect, we have not a shadow of doubt that Mr. Todd will thank us for calling his attention to it, and adopt it from January 1st, 1881.

There are at the Adelaide Observatory two thermometer stands—one resembling Glaisher's, the other an octagonal wooden house with louvre roof and dwarf lattice side, and a stand to carry the thermometers, made something like a Glaisher's, but of painted canvass instead of solid wood. Mr. Todd says, "As a rule the thermometers on this stand do not rise so high as those on the Greenwich stand, but I am disposed to think that the results obtained are more reliable." We think so too; a full tabular comparison of the results on the two stands is given, and it seems to us clear that the thermometers on the Glaisher stand heat up unduly by radiation from the earth.

The observations are now in nearly all respects equal to those of the finest European stations. We do not attach much importance to the absence of a thermograph, but we should like to hear that a barograph, either a Redier or photographic, has been supplied. As regards radiation, both solar and terrestrial, the newest and best forms of instrument have been supplied, and Mr. Todd follows the very wise, but also rare, course of keeping the old instruments going as well as the new ones, and printing the values of both. This rule prevails throughout Mr. Todd's work, of which we can hardly give a better specimen than by quoting the paragraph referring to evaporation. We know of no European observatory where such judicious arrangements are in operation :—

EVAPORATION.—Atmometer No. 1 consists of a large box or tank, made of well seasoned red gum, lined with zinc; the tank is four feet square, and three feet six inches deep; it is sunk in the ground to a depth of nearly three feet, and is kept filled with water to within three or four inches of the top. The

observations are made in the following manner :—A stout brass bar is placed diagonally over one corner of the tank, resting horizontally on two iron plates; at right angles to this bar is a vertical rod, movable by rack and pinion, graduated to one-tenth of an inch, and read off by means of a fixed vernier to one-hundredth of an inch. The rod, which is pointed at its lower end, is carefully set to the water-level inside a glass tube of two-inch bore, reaching from the bottom of the tank, the lower end of the tube being perforated, by which means a perfectly smooth surface is secured, even in high winds. A rain gauge (No. 1090) by the side of the atmometer measures the rainfall received in the tank.

Atmometer No. 2 is sunk in the dome paddock. This consists—first, of a brick tank lined with cement; internal measurement four feet six inches square, and three feet two inches deep. Inside this tank is another made of slate, three feet square and three feet deep, leaving an intervening space between it and the larger tank of seven inches. Both tanks are filled to the same level, or to within three or four inches of the top, fresh water being added as required. The evaporation is measured by a graduated vertical rod, which is carried by a float placed in a vertical cylinder of copper three and a quarter inches in diameter (perforated at the bottom), standing in the inner tank. The rod is graduated to one-tenth of an inch, and is read off by a fixed vernier to one-hundredth of an inch. This atmometer was first used in August, 1877, and the following table shows the amount of evaporation indicated by both tanks in each month, from September, 1877, to 1878 :—

	Old Tank. in.	New Tank. in.	Ratio. New Tank—Old Tank. in.
1877.			
September	3·169	2·661	0·840
October	5·549	4·965	0·895
November	7·086	6·416	0·905
December	9·663	8·739	0·904
1878.			
January	12·265	10·250	0·836
February	7·980	6·714	0·841
March	7·500	6·220	0·829
April	4·126	3·575	0·867
May	2·262	2·145	0·948
June	1·772	1·702	0·960
July	1·829	1·672	0·915
August	2·869	2·348	0·818
September	3·900	3·393	0·870
October	6·126	5·445	0·889
November	8·358	7·117	0·852
December	10·204	8·219	0·805

From the commencement of 1878 the readings of the new tank have been adopted; but in the monthly results the total evaporation as shown by both atmometers is given, the reading of the old tank being used for comparison with previous years.

Considerations of space alone prevent our noticing other important items, but we must just mention before leaving the question of evaporation, that the amount in 1878 was 58·80 in. by the new tank, and 69·19 in. by the old one, the latter value being near the average given by the old instrument.

We must finally call attention to two notes, one upon observations of the upper currents of the atmosphere, and the other on the rate of progress of marked features in atmospheric pressure across Australia.

THE COBHAM JOURNALS. *Abstracts and Summaries of Meteorological and Phenological Observations made by* MISS CAROLINE MOLESWORTH, *at Cobham, Surrey, in the years* 1825 *to* 1850, *with Introduction, Tables, &c., by* ELEANOR A. ORMEROD, F.M.S. 8vo. London: Edward Stanford, 1880.

WE are not going into a psychical or theological disquisition, but there can be no harm in saying, that *if* those who have passed from us know anything of subsequent terrestrial matters, Miss Molesworth must have experienced an unusual degree of pleasure in watching the completion of the volume now before us.

But we must epitomize the history of the work, and after reading that epitome, and better still the book itself, we believe that all our readers will agree in the verdict which we have just indicated.

We need not stop long over the biography; we knew Miss Molesworth well during many years, and consider that Miss Ormerod gives a very life-like portrait; perhaps, if we were asked to give our own impressions, they would assume the form of a string of adjectives, in which we should certainly place brisk, brusque, incisive and kind. For fuller details the work must be referred to. Miss Molesworth at the age of 29, removed with her mother, Lady Molesworth, to Cobham Lodge, Surrey, in the year 1823, and at once started the meteorological and phenological register upon which the present work is based. It is not very easy to fully appreciate the difficulty of starting a series of meteorological observations in the early part of this century; years before any systematic record was started at Greenwich, or indeed at *any* observatory in the British Isles, and when not even blank forms for observations could be purchased. However, Miss Molesworth bought her instruments, and mounted them, read some of the best books then published, procured some thick quarto volumes of blank paper, ruled out a capital form of register and commenced her record. Miss Molesworth, like the majority of meteorological observers, lived beyond the ordinary three score years and ten, for she only died at the age of 78, leaving five of these thick volumes, the early ones especially, crammed with records of vegetable and animal life in addition to the usual meteorological data.

These volumes were by her wish presented by Sir Paul W. Molesworth, Bt., to the Meteorological Society—a course of action which we venture to commend for an example to others who may possess long continued MS registers. To search through, examine, and classify the mass of data in these volumes was such a labour, as few have the leisure and fewer still the courage to attack; but after a preliminary trial, Miss Ormerod undertook the task, and she has completed it in a manner which we cannot doubt will meet with universal approval.

We make no extracts, for if we did we should want to quote the whole chapter entitled Results of Observations; therefore, we leave

the work with one concluding remark, viz., that in our own mind the book classes along with Gilbert White's "Selborne;" it is a much more systematic and far less chatty book than White's, but each has its advantages, and we put the two side by side.

THE ATALANTA.

AT the meeting of the Meteorological Society on May 19th, Mr. G. J. Symons, F.R.S., president, in the chair, Messrs. T. H. Edmonds, F. Ekless, A. H. Taylor, and T. Turner were elected Fellows of the Society. A paper was read by Mr. C. Harding, F.M.S., on the Winds and Weather experienced in the North Atlantic between lats. 30° and 50° during February and March, 1880. This period includes the time during which Her Majesty's ship Atalanta was on her homeward passage, as she left Bermuda on January 31st. From the *data* collected it is shown that a gale blew in the Atlantic every day throughout the month of February, except on the 21st and from the 24th to the 27th. It appears probable that the Atalanta would not have met with any exceptionally severe weather earlier than about the 12th or 13th of February, and allowing that she had averaged from five to six knots per hour on her homeward course, she would on that date have inevitably encountered a severe hurricane. A heavy gale is noted on the 12th in lat. 38° N. and long. 45° W., which is in the direct homeward bound track from Bermuda; and if the Atalanta had averaged only four knots per hour on her homeward course she would fallen in with this gale. The storm of the 12th and 13th may fairly be deemed about the most severe during the two months of February and March. It may be remarked that the Norwegian barque Caspaei was north of Bermuda on the 3rd, and was in the full force of the gale on the 12th; her distance made, shows that the winds were favourable for a homeward passage from Bermuda. The correspondence from Her Majesty's ship Salamis, published in the *Times* of the 6th of May, states, on the authority of the captain of the Caspaei, that on February 12th, in lat. 42° 43′ N., long. 39° 25′ W., while running before the wind, he encountered the severest gale he had ever experienced. The ship would not steer, and could not be prevented from broaching-to. She was thrown on her beam-ends, and remained so for 19 hours, the cargo of cotton keeping her afloat. Several ships were in sight at the time of the commencement of the gale, and were unable to lay-to on account of its suddenness.

The following papers were also read:—"Variations in the Barometric Weight of the Lower Atmospheric Strata in India," by Prof. E. Douglas Archibald, M.A., F.M.S.; "On the Meteorology of Mozufferpore, Tirhoot, for the year 1879," by Charles N. Pearson, F.M.S. The Radiometer invented by D. Winstanley, was also exhibited. Its records were extremely delicate.

SUPPLEMENTARY TABLE OF RAINFALL IN MAY, 1880.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	...	XI.	Corwen, Rhug	2·16
,,	Margate, Acol	·15	,,	Port Madoc	2·21
,,	Littlehampton	·48	,,	Douglas.....	·82
,,	St. Leonards	·07	XII.	Carsphairn	2·62
,,	Hailsham	...	,,	Melrose, Abbey Gate...	·77
,,	I. of W., St. Lawrence.	·37	XIV.	Glasgow, Queen's Park.	1·06
,,	Alton, Ashdell.....	·19	XV.	Islay, Gruinart School..	1·46
III.	Great Missenden.....	·23	XVI.	Cupar, Kemback.....	·91
,,	Winslow, Addington ...	1·15	,,	Aberfeldy H.R.S.	·55
,,	Oxford, Magdalen Col...	·77	XVII.	Tomintoul.....	1·12
,,	Northampton	1·08	,,	Keith H.R.S.	1·57
,,	Cambridge, Merton Vil.	·67	,,	Forres H.R.S.	·45
IV.	Harlow, Sheering	·53	XVIII.	Strome Ferry H.R.S....	2·58
,,	Diss	·59	,,	Auchnasheen H.R.S. ...	...
,,	Swaffham	·59	,,	Lochbroom	2·82
,,	Hindringham	1·09	,,	Tain, Springfield.....	·56
V.	Salisbury, Alderbury...	·55	,,	Loch Shiel, Glenfinnan.	4·53
,,	Calne, Compton Bassett	·92	,,	Dalwhinnie H.R.S.....	...
,,	Beaminster Vicarage ...	1·08	XIX.	Lairg H.R.S.	1·94
,,	Dartmoor, Princetown..	1·39	,,	Altnabreac H.R.S.	1·50
,,	Langtree Wick	1·61	,,	Watten H.R.S.	1·18
,,	Lynmouth, Glenthorne.	1·81	XX.	Fermoy, Glenville	1·36
,,	St. Austell, Cosgarne...	1·15	,,	Tralee, Castlemorris ...	1·41
,,	Taunton	1·34	,,	Cahir, Tubrid	·89
VI.	Bristol, Ashleydown ...	1·29	,,	Tipperary, Henry St....	1·20
,,	Ross	...	,,	Newcastle West	1·39
,,	Wem, Sansaw Hall.....	1·15	,,	Kilrush	1·15
,,	Cheadle, The Heath Ho.	2·65	,,	Corofin	1·29
,,	Bickenhill Vicarage ...	1·73	XXI.	Kilkenny, Butler House	...
VII.	Melton Mowbray	1·44	,,	Carlow, Browne's Hill..	·75
,,	Horncastle, Bucknall ...	1·11	,,	Kilsallaghan.....	·79
VIII.	Walton-on-the-Hill.....	2·24	,,	Navan, Balrath	·38
,,	Broughton-in-Furness ..	2·59	,,	Athlone, Twyford	1·03
IX.	Wakefield, Stanley Vic.	2·38	,,	Mullingar, Belvedere ...	1·36
,,	Ripon, Mickley	1·97	XXII.	Ballinasloe	1·54
,,	Scarborough.....	2·28	,,	Clifden, Kylemore	4·27
X.	Mickleton.....	1·83	,,	Crossmolina, Enniscoe..	2·15
,,	Haltwhistle, Unthank..	1·91	,,	Carrick-on-Shannon ...	1·40
,,	Shap, Copy Hill	1·12	XXIII.	Dowra	2·19
XI.	Llanfrechfa Grange	1·74	,,	Rockcorry.....	·89
,,	Llandovery	2·75	,,	Warrenpoint	1·03
,,	Solva	1·14	,,	Newtownards	·97
,,	Castle Malgwyn	1·90	,,	Carnlough.....	1·43
,,	Rhayader, Nantgwillt..	3·15	,,	Bushmills	·94
,,	Carno, Tybritle	2·71	,,	Buncrana	1·78

MAY, 1880.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	Camden Square	·26	— 2·14	·21	31	5	85·0	26	33·8	1	0	5
II.		Maidstone (Hunton Court)	·09	— 2·15	·05	5	4	...	...	...	...	...	...
,,		Strathfield Turgiss	·56	...	·22	11	9	79·1	26	28·3	1	4	11
III.		Hitchen	·88	— 1·05	·25	27	7	74·0	26	28·0	1	3	...
,,		Banbury	·91	— 1·31	·37	27	9	72·8	21	32·0	1	1	...
IV.		Bury St. Edmunds (Culford)	·43	— 1·73	·12	4	8	84·0	26	28·0	18	2	7
,,		Norwich (Cossey)	·75	...	·17	10	9	82·5	26	31·5	2	2	4
V.		Bridport	1·13	— ·90	·24	27	7	...	...	...	...	...	...
,,		Barnstaple	1·61	— ·83	·73	26	8	73·0	21	38·0	9	0	...
,,		Bodmin	1·36	— 1·10	·59	26	8	75·0	21	35·0	1,2	0	3
VI.		Cirencester	·82	— 1·46	·23	27	8	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	2·43	+ ·17	1·33	26	8	67·0	21*	31·0	1	1	2
,,		Tenbury (Orleton)	2·71	— ·17	1·23	26	11	73·3	21	29·8	1	3	8
VII.		Leicester (Town Museum)	1·63	...	·41	11	15	69·2	26	32·1	1	...	13
,,		Boston	1·19	— ·75	·33	11	12	74·0	21	33·0	9	...	...
,,		Grimsby (Killingholme)	1·28	...	·40	26	9	67·0	21*	32·0	8	1	...
,,		Mansfield	1·78	...	·57	26	10	68·3	20	32·6	7	0	4
VIII.		Manchester (Ardwick)	2·17	— ·21	1·22	26	8	69·0	20	38·0	1	0	...
IX.		York	2·12	+ ·17	1·12	26	11	71·0	19	33·0	1	0	...
,,		Skipton (Arncliffe)	3·17	— ·18	1·35	23	11	74·0	20	31·0	6	2	...
X.		North Shields	1·32	— 1·32	·64	26	13	65·0	19	34·7	8	0	...
,,		Borrowdale (Seathwaite)	6·62	— 2·92	4·14	23	12	...	...	...	...	...	...
XI.	WALES.	Cardiff	1·45	...	·46	26	11	77·4	20	34·4	1	0	...
,,		Haverfordwest	2·09	— ·63	1·29	26	7	71·7	15	31·5	7	1	9
,,		Aberdovey	...	...	...	..	...	...	...	...	...	...	...
,,		Llandudno	1·78	— ·60	·85	26	8	62·8	19	36·4	1	0	...
XII.	SCOTLAND.	Cargen	·90	— 1·53	·41	23	10	70·6	20	32·2	9	0	...
,,		Hawick (Silverbut Hall)	1·31	...	·28	10	12	...	...	...	...	...	...
XIV.		Douglas Castle (Newmains)	·98	...	·34	30	9	...	...	...	...	...	...
XVI.		Loch Long (Arddaroch)	...	...	...	...	...	...	...	...	...	...	...
,,		Kilmory	1·96	...	·58	30	11	...	...	30·0	7,8	5	...
,,		Mull (Quinish)	2·14	...	·56	30	16	...	...	...	...	...	...
,,		Loch Leven	1·20	— 1·00	·60	31	6	...	...	...	...	...	...
XVII.		Arbroath	·80	— 1·18	·28	30	6	72·0	19	36·0	5,9	0	...
,,		Braemar	·62	— 1·18	·15	24	10	69·2	21	27·5	9	7	16
XVIII		Aberdeen	·86	...	·40	28	11	68·0	19	33·0	4	0	...
,,		Portree	2·97	— 2·68	·76	25	16	...	...	...	...	...	...
,,		Inverness (Culloden)	·55	— 1·01	·18	24	7	67·5	19	31·5	4	1	11
XIX.		Dunrobin	1·20	— ·25	·25	23	13	62·0	20	32·5	3	0	...
,,		Sandwick	1·66	— ·60	·23	18	18	57·2	31	36·7	7	0	3
XX.	IRELAND.	Cork	...	...	...	...	...	...	...	...	...	...	...
,,		Darrynane Abbey	...	...	...	...	...	...	...	...	...	...	...
,,		Waterford	1·07	— 1·18	·31	1	10	74·0	20	35·0	1	0	...
,,		Killaloe	2·05	— 1·13	·55	23	12	81·0	19	33·0	3	0	...
XXI.		Portarlington	·89	— 2·31	·26	23	10	72·0	20	35·0	8	0	...
,,		Monkstown	·65	— 1·26	·18	31	8	...	...	...	...	...	...
XXII.		Galway	1·30	...	·29	29	16	71·0	18†	39·0	5‡	0	...
XXIII		Waringstown	1·02	...	·33	23	14	74·0	18	29·0	7	1	6
,,		Londonderry	1·46	...	·26	30	17	67·0	9	34·0	8	0	4
,,		Edenfel (Omagh)	1·43	...	·47	23	16	77·0	17	26·0	7	6	0

* And 26. † And 20. ‡ And 9, 13, 28, 29.

\+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON MAY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—Notwithstanding cutting easterly winds and frosty nights, long hours of bright sunshine have so warmed the soil that a wholesome development of vegetation has taken place, and both wheat and spring crops are looking well. Lilac in flower on 2nd; horse-chestnut on 5th; monthly rose on 14th; pink may on 17th; and white clover on 29th. Turtle doves first seen on 6th; martins on 12th; swifts on 16th; cockchafer on 17th; and common blue butterfly on 23rd.

BANBURY.—Oak leafing early in the month, ash nearly at the end; very little blossom on the hawthorn; wheat looking remarkably well. A good deal of high wind in the latter part of the month. Hawthorn in bloom on 20th; H on 28th.

CULFORD.—A very dry month. Mean temp. 52°·5. Bar. very high on 29th and 30th. Polar winds prevailed during 21 days. Distant T on 26th.

COSSEY.—Wheat looking strong and healthy, though backward; grass in meadows very short.

BODMIN.—Severe drought; springs very low. Mean temp. 56°·1

CIRENCESTER.—A cold dry month; prevailing winds E. and N.E.

ORLETON.—The weather till the 23rd was generally fine and dry, with strong winds from N. and E., and very cold till after the 17th, when it was much warmer for a few days. On the 23rd the wind changed to S.W., and was followed with a cloudy sky and much R, a great but gentle fall occurring on the 26th and 27th. On the 3rd a TS from E. passed to S.E., accompanied by great darkness and a steady fall of R, and there was another steady fall of R on the 10th and 11th, so that, although a dry month, the rainfall was nearly the average. Mean temp. rather more than 1° below the average. Apple trees in blossom at the beginning of the month. First whitethroats and redstarts seen on 13th, but the number of summer birds is very small. Thrushes are rarely seen or heard; blackbirds are scarce, and even the robin has become a rare bird.

BOSTON.—The weather was generally fine and dry, too dry for the grass land, but very beneficial for cleaning arable land. Vegetation generally backward. Lilacs in flower about the 10th, and hawthorn and laburnums about the 23rd. Distinct solar halo between 9 and 10 a.m. on 13th. N.E. winds blew persistently for 16 days. Mean temp. 1°·4 below the average.

KILLINGHOLME.—Month cold and dry; prevailing wind E., but the prospects for the future are cheering. T on 28th.

SEATHWAITE.—Frosts at night at the beginning of the month, and warm days. A great deal of easterly winds in the middle of the month; storm on 23rd, with 4·14 in. of R.

WALES.

HAVERFORDWEST.—From the 21st of April to the 25th of May, only ·45 in. of R fell, and easterly winds prevailed during the whole of that period, very strong at times, with bright sunshine and high day temperatures from the 13th to the 21st of May; but the nights, with few exceptions, were cold the whole month. Oak in leaf before the ash; both late. On the 26th a heavy rainfall took place, and the month ended showery and cold. The country looks remarkably well considering the drought.

LLANDUDNO.—The month was characterised by a large amount of sunshine, but the temp. was rather more than 1° below the average. The rainfall was very unevenly distributed, nearly all of it falling after the 25th. Grass and all other crops greatly freshened and improved by the R at the end of the month.

SCOTLAND.

HAWICK.—E. winds prevailed from the 2nd to the 18th, and the rainfall was below the average; the fields would be greatly improved by a good soaking of

R, and unless it soon comes the hay crop will be light. Pear trees have very little blossom, and gooseberries were injured by frost on the 3rd.

QUINISH.—Bright sunshine, parching winds, and occasional frost at night from 1st to 18th; cold, stormy and showery from 18th to 28th; warm, with R, from 29th.

BRAEMAR.—A very dry month, with cold E. winds.

ABERDEEN.—Easterly winds prevailed till the 19th, followed by north-westerly and northerly till the 23rd, and south-westerly with occasional showers and milder weather till the 31st. Rainfall greatly below the average, but vegetation looks healthy and well advanced for the time of year. Squally on 24th, the wind occasionally reaching a strong gale in force in S. gusts. R and heavy H on 28th.

PORTREE.—A cold, frosty, dry month; pastures very backward.

CULLODEN.—Weather very dry from 1st to 9th and from the 11th to the 24th. Bar. very steady and high from the 4th to the 19th.

SANDWICK.—Generally a pleasant month. Rainfall and temp. nearly the average, but the farmers complain of the dryness. There was a gale of 50 miles an hour from 3 to 4 p.m. on the 24th, and one of 43 miles from 10 to 11 p.m. on 26th. Three peals of T on 27th and aurora on 1st.

IRELAND.

KILLALOE.—Country white with S on the morning of the 3rd. Brilliant weather followed with N. winds, and the 19th was very warm. Meadows and pastures in want of R. Very little bloom on hawthorn and none on blackthorn.

MONKSTOWN.—The driest May since my record began in 1864, except 1871, when only ·35 in. fell. The early part of the month was characterized by cold, dry northerly and easterly winds from the 17th to the 21st; fine and warm H on 22nd.

WARINGSTOWN.—Very fine and dry, with hot sun, though the wind was sometimes cold and the nights frosty, but the sunshine has heated the ground as proved by the high readings of the ground thers., and the effects on vegetation is evident, growth being more luxuriant than the apparent atmospheric conditions would account for.

LONDONDERRY.—The mildest and dryest month for some time. Wind principally N.E. and S.W.

THE WEATHER.

NEVER have I known those tree proverbs more exactly verified—

"Oak before Ash,
Have a splash.
Ash before Oak,
Have a soak."

Here, in Mid-Surrey, we have had scarcely "a splash" of rain for weeks, and would almost welcome now a day or two of last year's ceaseless "soak."

There is another saying:—

"If the Oak before the Ash comes out,
There has been or there will be drought."

Our oaks all about are abundantly out in leaf, whereas the ash hardly makes a sign.

"As black as Ash buds in the front of May,"

sings Mr. Tennyson, that very close observer of nature; and black ash buds there may be, but not a sign of a leaf, while as for the roses "the survival of the fittest" proceeds merrily on.—*Journal of Horticulture, May 20th.*